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# AAZK Animal Keeper Forum

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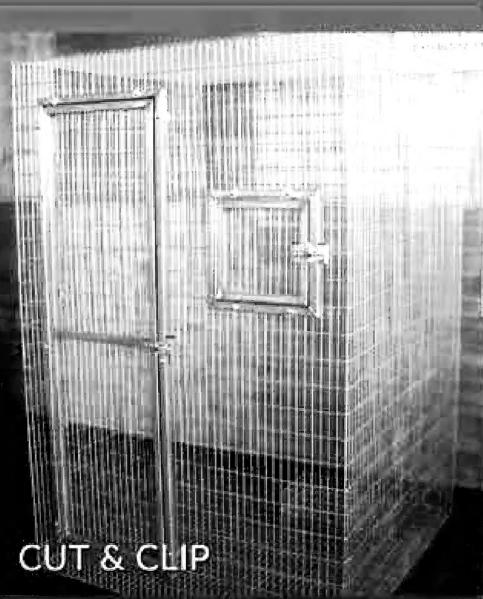
### CORRECTION

We apologize for an error in the April AKF 2022. In the article *The Price of Experience: An examination of zoo and aquarium internships* by Hilary Colton, the chart Figure 1. Percentage of paid internship availability (23) compared to unpaid (145) erroneously depicted 87% internships were paid. This chart should have shown 87% unpaid.

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American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

## ABOUT THE COVER

This month's cover photo comes to us from Zel MacWilliams of Oglebay's Good Zoo, featuring an adult Indian Peacock (*Pavo cristatus*). Peafowl hold great cultural significance in their native country, India, and in many others. Their mythology and symbolic importance can be found in cultures around the world, ancient to modern. With iridescent plumage and captivating "eyes" on their ornamental tail feathers, they were regarded as the birds for royalties, a symbol of great wealth. These days, the fabulous Peacock and his hens are more widely available for viewing and even farming.

Often when I would walk around the zoo, admiring the variety of fascinating, exotic species, I would often find the most visitors gathered around the Peafowl exhibit. Their children would laugh and squeal with delight when the Peacock's long tail would rustle to life, expanding to its full display. With his loud call, his energetic dance around the hens, and the kaleidoscope of colors from his tail brilliantly illuminated by the light; he was an enthralling spectacle. The scene will always hold a special place in my heart; from the beauty of the bird, to the joy of the children, but mostly for the peaceful indifference of the Peahens, whom calmly carried on foraging, seemingly unaware of it all.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for AKF. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is [shane.good@aazk.org](mailto:shane.good@aazk.org). If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: [aazk.org/akf-submission-guidelines/](http://aazk.org/akf-submission-guidelines/).

Deadline for each regular issue is the 3<sup>rd</sup> of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

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*The theme of this year's AAZK Conference is "Putting the Eh! in Collaboration" as attendees will share their innovations, experience, research and passion with each other to make a greater impact with the work we do.*

Registration is now open for the 2022 AAZK National Conference hosted by the Toronto Zoo and their local AAZK Chapter! It's hard to believe, but the last time we had a "normal" AAZK Conference was back in 2019. A lot has changed about seemingly everything since then, but the opportunity to learn, network, and connect with other animal care professionals remains one of the most exciting parts of my year.

The theme of this year's AAZK Conference is **"Putting the Eh! in Collaboration"** as attendees will share their innovations, experience, research and passion with each other to make a greater impact with the work we do. The program is starting to come together for workshops, papers, and posters, but many of the highlights have already been announced.

The **Keynote Speaker** will be **Travis Steffens**, the **Executive Director of Planet Madagascar** and Assistant Professor at the University of Guelph. Planet Madagascar is a conservation education and community development not-for-profit organization working towards the conservation of Madagascar's biodiversity and improving the lives of people who live there.

Three unique 12-hour **Professional Certificate Courses (PCC's)** are being offered, but space is limited so sign up fast if you're interested in taking part. **The Bear Necessities: Advanced Polar Bear Care sponsored by Polar Bears International** is designed for keepers that are interested in more advanced information on polar bear husbandry and care. This course will concentrate on polar bear nutrition and seasonal changes, reproduction/hand-rearing, behavior, training/enrichment and the polar bear keeper's role in conservation. **Everything You Need to Rhino-KNOW: Advanced Rhinoceros Care sponsored by the International Rhino Foundation** is designed for keepers that are interested in advanced information about White Rhinoceros, Greater One Horned Rhinoceros, and Black Rhinoceros husbandry. This course will be divided into three categories: nutrition, seasonal husbandry, and reproduction. **Animal Transportation sponsored by Milliken Meat Products Ltd** covers various concepts pertaining to animal shipment on a national and international level. Topics covered will include regulation, governance, taxa specific requirements, veterinary preparedness, training, and the future of animal shipment.

And as always, annual highlights such as the Icebreaker and Zoo Day, both hosted at the Toronto Zoo, Awards Ceremony, Exhibitor Hall, Silent Auction, and Closing Banquet will all be taking place. So register now and consider taking part in the 2022 Chapter Challenge and supporting the hard work of the members of the Toronto Zoo AAZK Chapter. I hope to see many of you this October and visit [AAZK2022.org](http://AAZK2022.org) to learn more!

A handwritten signature in black ink, appearing to read "Paul B".

Thank you,

Paul

Paul.Brandenburger@AAZK.org

# CALENDAR

JULY 2022

July 18-24

## National Zookeeper Week

AUGUST 2022

2022 ORANGUTAN SSP HUSBANDRY WORKSHOP AND COURSE

Hosted by the Little Rock Zoo

August 14	SSP Steering Committee Meetings (closed)
August 15	Husbandry Course
August 16 - August 18	Workshop
August 19	Post Trip

OCTOBER 2022

October 13-17

AAZK National Conference, Toronto, Canada

Submit your events to Shane Good -Shane.Good@aazk.org

# Bingwa and Mate Plus Eight

*Carolyn Mueller Kelly, Carnivore Keeper*

*Saint Louis Zoo*

*St. Louis, Missouri*





Photo 1. Bingwa and 1-week-old cheetah cubs, DEC 1, 2017. Photo by Carrie Felsher.

In the summer of 2017, the Saint Louis Zoo's Carnivore Unit introduced two cheetahs (*Acinonyx jubatus jubatus*) for breeding, based on a recommendation from the Association of Zoos and Aquariums' (AZA) Cheetah Species Survival Plan (SSP) program.

The two cheetahs, 9-year-old male, Jason, and 4-year-old female, Bingwa, had a history of successful introduction for breeding purposes. Jason and Bingwa bred in February of 2017, producing a litter of seven cubs in May of that same year. Unbeknownst to Carnivore and veterinary staff, Bingwa contracted a uterine infection around the time of parturition. Even though Bingwa demonstrated strong maternal care, six of the cubs became weak and died within a day. The single surviving cub was sent to be successfully cross-fostered at Fossil Rim Wildlife Center. Cheetah females will rarely raise a single cub, so cross-fostering was in the best interest of this cub, as Bingwa recovered from her infection.

Breeding was observed between Jason and Bingwa during their August 2017 introduction and pregnancy was confirmed through fecal hormone analysis in October of 2017. Keepers prepared the Saint Louis Zoo's Cheetah Survival Center for the birth by installing a whelping box in the area's cheetah building and limiting access to the building to the two keepers currently assigned to the cheetah routine. The limited access kept Bingwa calm and acclimated to the small group of people who would be working near her cubs. At approximately 80 days gestation, keepers began securing Bingwa in the cheetah building overnight, as the overnight temperatures in November were dropping. Cheetah keepers began watching overnight footage from the building's cameras, looking for signs of impending labor and birth.

At approximately 95 days gestation, Bingwa refused meat and appeared restless, moving in and out of the whelping box, rolling on the ground and

vocalizing. Because of this behavior, she was secured in the cheetah building at this time. On the afternoon of November 26, 2017, Bingwa gave birth to the first cub of her fall litter. Bingwa gave birth to a total of four cubs before keepers left for the day. Managers observed the birth of four more cubs on the building's cameras that evening and overnight, for a total litter of eight cubs.

Though Bingwa's litter was considered remarkable, Carnivore staff knew that Bingwa and her cubs were far from being "out of the woods." Bingwa had shown strong maternal behavior with her litter in May, but eight cubs were a lot for even an experienced cheetah mother, and Bingwa had never cared for a litter of her own to maturity.

After giving birth to her cubs, Bingwa immediately demonstrated strong maternal ability. She quickly consumed the placenta, groomed each of the cubs, and the cubs appeared to be nursing (Photo 1). She stayed in the whelping

box with her cubs, occasionally getting up to stretch her legs or drink from the lixits. On the 30<sup>th</sup> of November, Bingwa resumed eating meat and the cubs began opening their eyes. By early December, when the cubs were about a week old, they began crawling with increasing mobility. A few even stood up briefly, on four legs.

The cubs continued to gain mobility and confidence. Thus far, the only human interaction for the family were the cheetah keepers, who worked quietly in the building throughout the day. Managers and veterinary staff monitored their progress via camera and through communication from keepers, who observed Bingwa and all eight cubs carefully. Keepers were very hands off, working to support Bingwa but never interfering with the natural maternal process as it progressed.

On December 21, when the cubs were 3.5 weeks old, Carnivore and veterinary staff handled them for the first time--weighing them, sexing them, and doing well checks. Bingwa was shifted outside during this brief time. All of the cubs were deemed to be fairly healthy with weights averaging 1.13 kg. Once a week, the cubs were weighed and given health checks in this same, brief manner. The cubs, Moja, Mbili, Tatu, Nne, Tano, Sita, Saba and Nane were named for the Swahili numbers 1-8 (Photo 2).

On December 30, at about 5-weeks-old, several of the cubs climbed out of the whelping box. Keepers briefly shifted Bingwa into an outside yard and manually placed the cubs back into the box with their siblings. Later in the day, several cubs exited the box again. Bingwa made a few attempts to pick up the cubs and bring them back into the box, however, she did not appear confident in this process, and so keepers once again shifted her outside and returned the cubs to the whelping box. At this point, keepers used two-by-fours to build a makeshift "staircase" to allow the cubs to climb



Photo 2. Bingwa and 3-week-old cheetah cubs, December 20, 2017 Photo by Carolyn Kelly.

back into the box on their own. The next day, cubs were observed climbing out of the box and then using the new "steps" to climb back in. A few days later, Bingwa was observed, via the overnight camera, successfully picking up cubs and carrying them back to the whelping box herself. Later, these steps became a favorite resting spot for the cubs.

On January 5, at 5-weeks-old, the cubs were observed investigating Bingwa's bowl of meat. Keepers began offering small bowls with 0.25 pounds of meat for each cub. Cubs continued to regularly nurse from their mom and by January 23 their fecals had transitioned from the light brown color of an animal on a milk-only diet to the usual dark brown color of a carnivore consuming meat. As the cubs continued to eat meat it was not unusual for them to vomit small piles of frothy liquid or meat, which were quickly consumed by their siblings. This was an occurrence which keepers monitored, but did not cause veterinary staff concern.

On January 16, at 7-weeks-old, the cubs received their first round of vaccinations and were each given a microchip for identification purposes. This procedure was planned in detail to ensure cub safety and minimize the time of process as well as time separated

from dam. Bingwa was shifted outside to a cheetah yard adjoining the building. Carnivore and veterinary staff worked quickly, handling each cub individually. Cubs were weighed on a scale with the assistance of a small barrel. They were then examined by veterinary staff and injected with the vaccination and insertion of the microchip. Once each cub's examination was complete, they were secured in a separate stall with the other cubs who had already completed their own "checkups." This process was repeated until all eight cubs were vaccinated, at which point Bingwa shifted back into the building to be reunited with her cubs. Keepers watched the reintroduction process carefully, however, Bingwa consistently demonstrated strong maternal care.

At this time, the cubs became increasingly active, often playing with one another and climbing both the mesh on their fences and on top of a wooden training chute. They learned how to deliberately use and drink from the building's lixits and began interacting with enrichment items, such as logs, jolly eggs and boomer balls. Keepers were continually monitoring the litter for the development of any health issues. We found that with increased activity, the cubs would occasionally sneeze. The correlation between

sneezing and activity was evident, but keepers still kept a close watch, being sure to confirm that cubs did not have runny eyes or discharge.

Around February 10, at 10-weeks-old, Carnivore staff noted that the smallest cub, Tano, was not as bright and active as his siblings. Veterinary staff responded and Tano was handled to receive fluids, antibiotics, a dewormer and bloodwork. Elevated kidney enzymes were reported, so Tano received a round of antibiotics. His sister, Nne, was the second smallest of the bunch. She also received fluids and a dewormer and her right, front leg was shaved for identification purposes. As a result of these exams, the cubs tested positive for ascarids and so the entire family received a dose of dewormer. Between February 10 and February 23, Tano received fluids, antibiotics and a weight check each day. Keepers began supplementing him by stick feeding him small meatballs when possible. Tano quickly adjusted and became accustomed to this routine.

On February 15, at 11-weeks-old, the cubs received their second round of vaccinations. Nne still appeared smaller than her six other siblings, so keepers began to supplement feed Nne meatballs, as well. Tano and Nne opportunistically approached keepers for these feedings throughout the day. The other larger cubs rarely interfered with this routine (Photo 3).

By late February, the cubs were quite active and deemed healthy enough to begin exploring their outside yards for the first time. The cubs were shifted, with Bingwa, into a small yard adjoining the cheetah building for a 30-minute session. At first, the cubs were cautious, moving together as a group. However, after following the confident lead of their mother, they quickly began to investigate the yard. As their outdoor sessions increased, they began to run and play throughout the yard, leaping over logs and chasing each other each



*Photo 3. Cheetah Cub, February 25, 2018 at 13-weeks-old. Photo by Carolyn Kelly.*

day. Bingwa often chortled to the cubs and monitored all eight with a proficient, calm demeanor. When the cubs first began to explore outside, the shift doors to the building had firehose flaps over them for temperature control. The cubs were reluctant to go through the firehose flaps to return to the building. After much coaxing, they shifted inside. The firehose flaps were then removed to avoid this problem in future outdoor expeditions.

On March 14, at 15-weeks-old, the cubs received their third round of vaccinations. Around this time, Carnivore staff noticed that Nne was beginning to walk with a limp. An analgesic was prescribed to alleviate her discomfort. In early April, keepers reported that Nne, who was still limping, appeared to have a curvature to her front legs. The curvature and the limp did not slow Nne down. She continued to keep up with her siblings and participate in their outdoor play sessions. Around mid-April, Nne's limp disappeared, but the curvature remained and was obviously pronounced. She was anesthetized and taken to the hospital for radiographs. Nne had radiographs taken several times that spring. It was determined that she had a slight ulnar deviation, potentially, but not definitively, caused by either a birth defect, a vitamin deficiency or an injury. As stated, this condition did not

slow Nne down and she continued to keep up with her siblings and exhibit species typical behaviors.

Tano remained the smallest of the cubs and was also examined at the veterinary hospital. With such a large litter, it was inevitable for there to be variation in the size and strength of the cubs. Tano and Nne were both prescribed Vitamin D drops to assist with their development. These were given by keepers in meatballs each day.

By now the cubs were confident in the outdoors, and ready for their debut to the public. In preparation, Carnivore staff worked closely with Facilities Management to "cub proof" the cheetah area's large, main habitat yard. Keepers looked at the yard with a critical eye, trying to anticipate the sort of mischief eight cheetah cubs might get up to. Young animals can often be energetic, of course, but these cubs were trouble times eight and had already proven themselves to be apt to take advantage of anything that may be overlooked. Any potential "cub sized" gaps between the fences and cantilevers were filled in with mesh. Staff tried to eliminate areas where the cubs might climb up too high and fall (all, even Nne, had proven themselves proficient climbers).

Ready or not, the cubs went out into the big yard on April 19, with the pathway in front of the cheetah area closed to the public. Caution soon gave way to wild play as the cubs ran, jumped, climbed and explored their new territory (Photo 4). The cubs were still spending the night inside of the cheetah building, so keepers paired shifting with presentation of their meat diets, as well as a playground whistle used as a cue to come inside. The cubs quickly picked up on this cue and (mostly) shifted inside promptly when the whistle blew.

On May 4, "The Bingwa Bunch," as the Saint Louis Zoo's Public Relations team aptly nicknamed them, were introduced to the people of St. Louis. They spent



Photo 4. Cheetah Cub, May 2018, 5-months-old.  
Photo by Megan Turner.

the morning romping through the display yard, much to the adoration of the public. They did not seem bothered by the presence of zoo guests, but continued to play, chase and wrestle in their yard each day. The cubs shifted out for AM yard sessions, shifted in at lunch for a meal, and then shifted back out for the afternoon before returning to the building overnight. This routine was time-consuming for Carnivore staff, but also allowed cheetah keepers to keep a close eye on each individual cub, making sure to monitor growth, health and appetite each day. By mid-May, the midday shift was eliminated and the cubs were allowed access outside overnight.

That summer, the cubs remained a curious and rambunctious bunch. They developed different personalities, however, despite caring for them each day, Carnivore staff were (with the exception of Tano due to his size and Nne due to her ulnar deviation) unable to tell them apart easily. The cubs liked watching staff use weed eaters and lawnmowers in the yards adjoining their own. They continued to play with jolly eggs or boomer balls, and enjoyed splashing around in kiddie

pools filled with water. Of course, the best enrichment was always each other. Eight playmates make for great company and the cubs frequently chased each other around the yard, wrestled or slept in a pile (or on top of Bingwa!) each day (Photo 5). Staff made sure only "cub friendly" adult cheetahs shared fence lines with the family in the adjoining cheetah yards. One male, Joey, demonstrated the best disposition for sharing a fence line with the cubs and so earned himself the nickname, "Uncle Joey."

Carnivore staff did not share space with "The Bingwa Bunch." Occasionally, one or two cubs would not shift in, and, in this scenario, keepers would share space in order to walk the cubs back into their overnight yard. However, staff did not share a yard with Bingwa and any of the cubs unless another keeper was present for backup. At over 20 pounds each, the days of catching up cubs for vaccines etc. were long gone.

In mid-March of 2019, when the cubs were just over 15-months-old, Carnivore staff knew that the day was quickly approaching to separate the male siblings from the females. "The Bingwa Bunch" was split into two groups—the males, Tano, Tatu and Mbili formed one group and the females, Bingwa, Nne, Moja, Saba, Sita and Nane formed the other. The cubs tolerated this separation well. They continued to interact with one another and rest together along shared fence lines between their yards.

At that point, 3.3 adult cheetahs lived at the Cheetah Survival Center, along with the eight cubs. As the cubs continued to grow, a new yard was built on a vacant space in the cheetah area to provide more yard options for all cats. This addition offered more flexibility when shifting and housing the cats. During the winter of 2018-2019, Carnivore staff worked to create an "artificial male coalition," in order to free up space in a large, cheetah yard. Male coalitions are a natural social grouping for cheetahs.

Typically, coalitions are made up of two brothers. However, occasionally, coalitions can develop between two males which know each other well and exhibit friendly dispositions with one another. Joey, a then 10-year-old male, and Suseli, an 11-year-old male, were what we called "fence friends." The two had arrived, based on SSP breeding recommendations, in St. Louis from White Oak Conservation Center in 2016. They'd known each other for a long time, and exhibited "friendly" behavior toward one another along their shared fence lines.

Carnivore staff began the thoughtful process of introducing the two males in the same yard, and letting their behavior be the guide in best care and management practices. The males had brief interactions—some paw slapping, some hissing—as they both tried to make sense of their new arrangement. However, the two also explored the yard together and rested near one another, exhibiting their comfort with living in proximity. After many weeks of introductions, Joey and Suseli began living with one another full-time at the end of March 2019, and an artificial male coalition was officially formed. The two were still separated (into feed yards) when they ate, but they demonstrated the ability to use their dens, interact with enrichment, and share space with one another in a peaceful, species appropriate way. Suseli proved to be a fine neighbor to Bingwa and the cubs, and respected their space along their shared fence line whenever interactions occurred.

Now that the cubs were older, they officially became a part of the Carnivore Unit's training program. Keepers target trained the cubs, and using this behavior as a foundation, were able to train them to go into a portable chute brought into the cheetah building. The chute was utilized to hand vaccinate the cubs, but it also came in handy in other ways. Though each of the cubs were microchipped, and the microchip

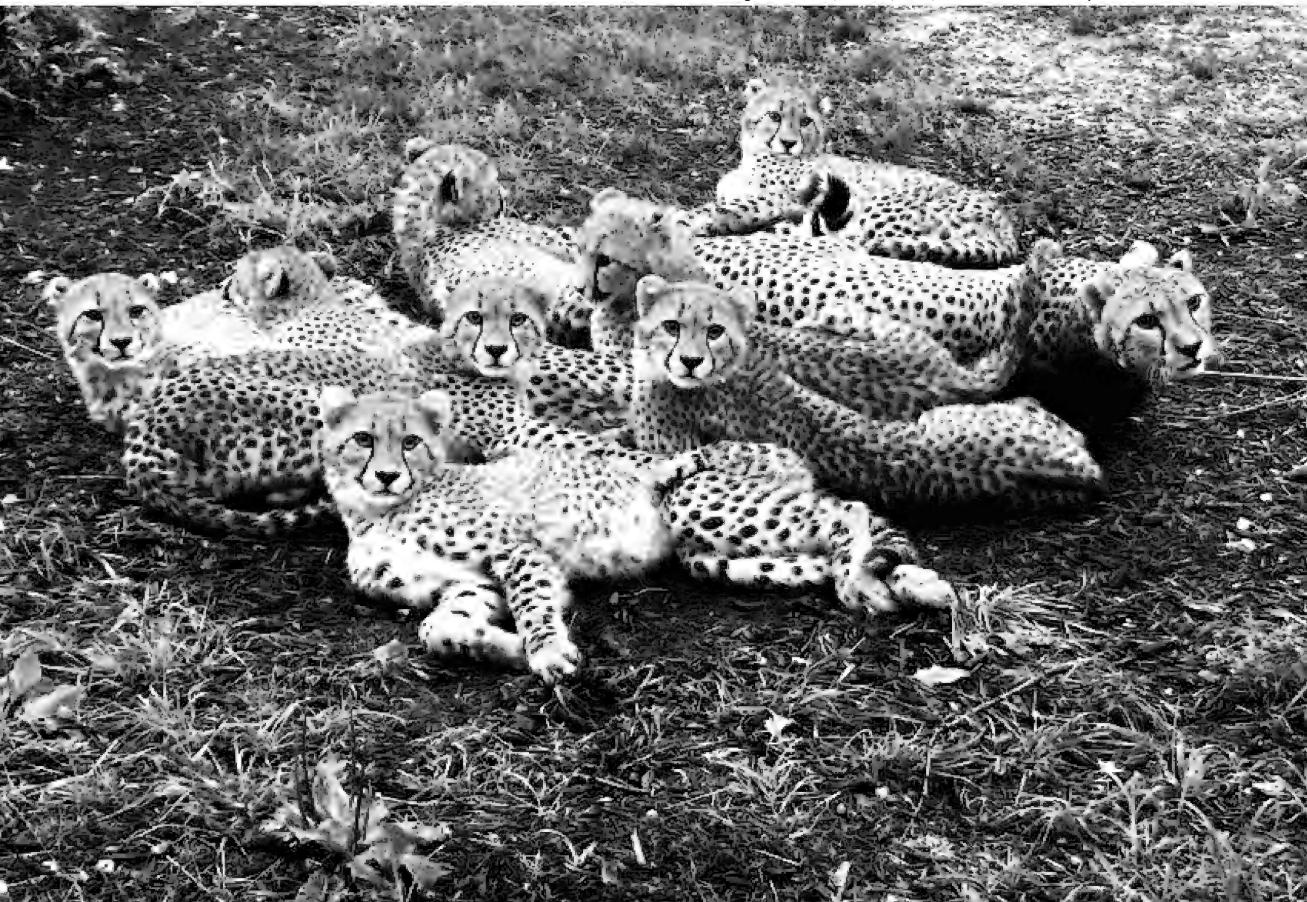
numbers could be read in the chutes, they were still very difficult for staff to tell apart visually. The males were pretty straight forward; Tano was the smallest, Tatoo was very large and Mbili had uniquely dark, brown eyes. But the females, just like the original "Brady Bunch," all had "hair of gold, like their mother." Keepers could pick out Nne, due to her radiated ulnas, but the other four were quite difficult to differentiate. To resolve this, the cubs were desensitized to shaving in their training chutes. With an electric razor, keepers shaved different areas of the females' bodies—a right shoulder, a left shoulder, a right hip and a left hip—for identification purposes. Because their hair grew back quickly, they needed to be shaved every few weeks.

The shave marks became increasingly important once the Saint Louis Zoo received SSP recommendations to send Sita, Saba and Nane to Lincoln Children's Zoo in the fall. To prepare for their departure, the female family was separated into two groups of three cats for up to four hours each day (starting with shorter time periods at first and increasing as the cats' behaviors indicated comfort with separation.) In order to do this, keepers needed to pick out these three from the bunch each morning, and shift them into an adjoining yard. With clear shave marks this task could be completed quickly and efficiently. Without the shave marks, this could take quite a bit of time (including long minutes of consultation with a photo chart, attempting to identify spot

patterns and tail lines).

To prepare for their departure, keepers were determined to crate train Sita, Saba and Nane. To make this possible on shipment day, the three cats would need to be trained to shift into crates secured in the cheetah building on cue, one cheetah per crate, all at the same time. It was a daunting task. After much discussion and planning, Carnivore staff secured three large, metal shipment crates to three of the shift doors that led into the cheetah building. At first, the three females were simply given (supervised) access to the crates to investigate and explore. Soon, they were asked to walk through the crates (the doors were off both ends of the crates) to get to their bowls of meat. They then

*Photo 5. Bingwa and cubs, June 27, 2018, 7-months-old. Photo by Carrie Felsher.*



progressed to eating their bowls of meat inside of the crates. During this phase, the sisters would often “bowl hop” moving from crate to crate eating from various bowls. We eventually wanted to eliminate this behavior in order to work toward the “one cheetah per crate” goal. Soon, we began closing the shift doors to the building when the females were inside of the crates eating their meals. This eliminated the “bowl hopping” and encouraged the cheetahs to calmly commit to their individual bowls. If they ever showed signs of stress or anxiety, the shift doors were opened and they were allowed access outside. The doors to the front of the crates were reinstalled. All three cheetahs practiced eating in the crates with doors shut in both the front and the back of the crate (the back door technically being the shift door). The actual crate door could be easily slipped into place on shipment day). Sita, Saba and Nane took to this behavior with calm poise and were fed this way each day leading up to their departure. This sort of training session required three keepers present. Each keeper needed to operate a shift door and monitor an individual cheetah. The Carnivore staff prioritized this training goal and made it happen, despite the obvious time constraints it created.

In early October of 2019, shipment day arrived. Sita, Saba and Nane all shifted into their crates when cued. All calm, one cheetah per crate, and all at the same time. The females were shipped to Lincoln and with that, “The Bingwa Bunch” officially separated.

Bingwa continues to live with her two daughters Moja and Nne at the Saint Louis Zoo. The males, Tano, Tatu and Mbili, live here too, together as a natural brother coalition sharing a yard.

When Bingwa gave birth to eight cubs in November of 2017 there were a lot of unknowns. Would all of the cubs survive? Would Bingwa be able to nurse and raise such a large litter? Could the Saint Louis Zoo house that many cheetahs in addition to the adults in the collection? The challenges created by eight cheetah cubs were numerous. They required immense time, dedication and creativity from the Carnivore keepers, veterinary staff and Animal Division Management at the Saint Louis Zoo. But mostly, staff members played a supporting role to Bingwa, who rose to the challenge. “Bingwa” is the Swahili word for “Champion” and through her experience she truly



Photo 6. Bingwa and 5.5-month-old cub, May 10 2018. Photo by JoEllen Toler.

lived up to her name. Bingwa nursed and raised eight cubs with patience, dedication and capable maternal care, making history by raising the first litter of eight cheetahs to be born at an AZA institution where all eight cubs both survived and were mother raised. Thanks to Bingwa, the Saint Louis Zoo’s Cheetah Survival Center was able to work toward the Cheetah SSP program’s ultimate goal—the care and conservation of this remarkable species (Photo 6). 

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## The AAZK Lee Houts Advancement in Environmental Enrichment Award

The American Association of Zoo Keepers' Lee Houts Advancement in Environmental Enrichment Award recognizes keepers who have made significant contributions towards environmental enrichment to improve animal care and welfare.

The AAZK Enrichment Committee established the Lee Houts Advancement in Environmental Enrichment Award in 2001. The Award was first presented to the AAZK Board of Directors by Lee Houts and was later named in her honor, due to her significant enrichment efforts, after her passing in 2005.

### Qualifications

- An individual member of AAZK, a team from a zoological institution, or a chartered AAZK Chapter, in good standing, are eligible to be nominated for this award.
- The nominee(s) **must** be Professional Members of AAZK, in good standing, and work in any North American zoological institution or organization.
- Nominee(s) must have improved the well-being of an animal or group of animals through outstanding keeper-initiated enrichment techniques
- The enrichment is to be **above and beyond** typified programs and achievements of current professional and industry standards.
- Nominees must have excelled in one or more of the following categories:
  - Impact on Animal Welfare
  - Versatility
  - Involvement
  - Sharing Knowledge/Education/Research

### Who Was the Recipient Last Year?

#### Robyn Jackson

"As keepers, we are tasked with an endless number of challenges for the animals in our care and I've chosen to focus on enrichment eliciting natural behavior. My goal is move towards the idea of enrichment as not just a thing or a toy, but a goal-oriented process where each keeper is thinking about the why before the what. By creating enrichment that is not only interesting to look at but also serves a function can hopefully help to inspire others' creativity and therefore providing our animals with elevated care. I'm honored to have received the award and even more so to see animals interacting with enrichment."



# Managing a North American Songbird Aviary at the Akron Zoo

*Mallory Balmert, Wild Animal Keeper II  
Akron Zoological Park | Akron, Ohio*



The Akron Zoo's Grizzly Ridge Aviary is home to 27 species of North American songbirds native to Ohio, including passernes, waterfowl and gamebirds. The Mike and Mary Stark Grizzly Ridge area of the Zoo highlights North America's native species including grizzly bears, North American river otters, red wolves, coyotes, and one of AZA's largest North American songbird aviaries, which was established in 2013.

Most of the aviary birds are wild-hatched birds that are rehabilitated after injury in the wild, and some are captive-hatched from other zoological facilities. Due to Akron Zoo's partnerships with Ohio Lights Out (Lights Out Cleveland and Lights Out Akron-Canton) and licensed-wildlife rehabilitators, the Akron Zoo can provide homes for many injured and rehabilitated non-releasable birds that are found in Northeast Ohio and the surrounding region. Ohio Lights Out is a program run by the Ohio Bird Conservation Initiative (OBCI) that "is working to prevent bird collisions [with buildings]." A study (Loss, Will, Loss, & Marra, 2014) estimates that over one billion birds die from building collisions in the United States annually, and this is most common during spring and fall migration. Most of these birds come to the Akron Zoo with wing injuries

or other types of physical traumas suffered from a window collision. After their quarantine period, they are flight-tested to ensure they can navigate the terrain of the aviary and perch and fly appropriately. By allowing these birds to have a second chance in the aviary, guests can gain an appreciation for native birds and learn about conservation actions they can take to



*Upper view of Akron Zoological Park's North American songbird aviary.*

*(Pictured left): Akron Zoo's North American songbird aviary from a distance*

help local wildlife. The Akron Zoo is a partner of OBCI and financially supports OBCI's Lights Out programs through the Akron Zoo's Conservation Fund.

The Aviary is a close representation of the birds' natural environment built into a hillside of the zoo. The terrain includes grass, dirt, rocks and a pool of varying depth and water flow. There are two indoor holding areas with shift doors directly to the habitat for birds to access shelter. These holdings can be split into two or connected into one large holding by a shift door. This is helpful for separating some birds for medical treatment, but still allowing them visual access to other birds, which fly in and out from the aviary. This is an immersive habitat, with guests able to walk on a wooden deck and view birds in trees at eye-level or look down into the habitat at the ground birds below. Staff attendants are not necessary to allow guest access into the aviary, due to a double set of magnetic doors that only allow one set to be open at once.

Seasonal changes greatly affect the management of the habitat. Winterization measures include the installation of multiple radiant heaters, bedding areas with straw, installation of pool heaters and a heated birdbath. Upwards of 40 cut spruce trees, donated by a local tree farm, are also added to the habitat to provide natural shelter for the birds. Small migratory species, such as warblers, are housed indoors during the coldest months to protect them from the elements. The winterization tools are removed in spring and nesting material is added in preparation of breeding season. During summer, the indoor holding temperatures are brought down by fans, the pool is cleaned weekly to prevent algae growth, and birds are misted intermittently throughout the day with a hose from the keeper area.

The Aviary promotes local conservation ideas that zoo guests can implement at home, such as feeding birds and planting bird-friendly trees and shrubs in their own backyards. The birds are fed on multiple hanging feeders placed throughout the habitat, with considerations being made to place them under shelter during inclement weather. There are also multiple seed feeders with seed mix that are continually restocked so the birds always have access to this mix. During winter, chopped nuts are added to the diet to help birds maintain appropriate weight. In the summer, nectar feeders are placed throughout the habitat. The birds are also fed wax worms daily throughout the year, which is a high-value food item, typically on the deck in the morning as a part of a training program. Trained behaviors include voluntary scale training, deck feeds and having birds eat from keepers' hands. Having birds come to the deck to feed or to keepers' hands allows for keepers to get a better visual on the birds and assess their



*The aviary's upper deck and educational graphics.*



*Author with Baltimore Oriole trained to come to hand for visual observation.*



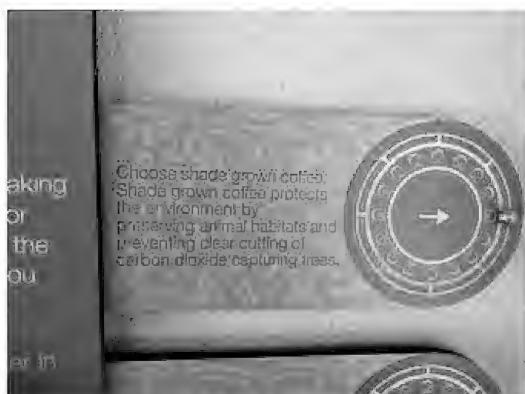
*Common Yellowthroat demonstrating voluntary scale training.*



Gray Catbirds taking advantage of cut spruce trees offered for winter cover.



Preventing bird window collisions is an AZA SAFE: North American Songbird priority. Akron Zoo financially supports and participates in our local Lights Out Akron/Canton and Lights Out Cleveland programs.



Promoting bird-friendly coffee is a focus of the AZA's SAFE: North American Songbird program and is interpreted in graphics at the Zoo.

physical well-being. Scale training allows keepers to better monitor the health of the birds and catch any medical issues early. Goals for future training include a recall into the holding area, station training to separate each species, crate training and a voluntary footbath behavior for preventative treatment of foot mites.

Challenges to managing a large multi-species aviary include getting visuals on birds on a regular basis, capturing birds from the habitat, tracking nests and nesting pairs, and accessing the habitat when repairs need made due to size of keeper doors, terrain and keeping birds from interacting with construction equipment. Training deck feed and hand feed behaviors help with getting visuals on birds and maintaining an accurate census of the birds. Future training of crate and recall behaviors could help with capturing birds from the habitat. Tracking nests has been made easier by using plastic numbered tags to mark individual nests and an online chart that has the ID tag, species nesting, possible parent ID accession numbers and comments to update during the nesting process (number of eggs, hatchlings, fledglings, etc.).

A dynamic, multi-species North American aviary can have many challenges regarding avian management. These challenges provide opportunities for innovation, collaboration and professional growth of the keepers who take care of it. The Aviary also provides many benefits to the zoo and community as it allows for educational opportunities for our local community. Recently, Akron Zoo has received a RemotEDx Grant that is a state-level initiative. The initiative brings together a unique mix of remote, hybrid and blended learning partners from across the state. It helps schools and districts enhance, expand and more effectively scale high-quality remote, hybrid and blended education delivery models.

The focus at Akron Zoo is on problem-based learning and local species conservation, with North American songbirds as a primary focus.

Akron Zoo is accredited by the Association of Zoos and Aquariums (AZA) and is a founding partner of the AZA's SAFE-North American Songbird Program. SAFE (Saving Animals from Extinction) is a program that leverages the conservation efforts of the AZA's entire membership, which includes 238 accredited zoos and aquariums. Primary goals of the SAFE-North American Songbird Program include:

- Addressing the effects of free-roaming domestic cats on songbird populations
- Preventing bird window collisions
- Addressing the impacts of the illegal wildlife trade on North American songbirds
- Prevention of habitat loss and the effects of non-native species on North American songbirds
- Increasing the awareness of the effects of environmental contaminants on North American songbird populations.

Many zoo visitors are surprised to see a North American songbird aviary in a zoo. They come expecting the traditional combination of "lions, tigers and bears..." which are also a focus of the Akron Zoo. However, North American songbirds have their own conservation message to share. While most people think of our North American songbirds as common, the truth is that these populations have declined at an alarming rate. The biodiversity crisis has come to our own backyards. According to the American Bird Conservancy, "In less than a single human lifetime, 2.9 billion breeding adult birds have been lost from the United States and Canada, across every ecosystem and including some familiar bird species." To put it another way, 25% of our North American songbirds have vanished from our landscape since the 1970s. Our hope is that the Akron Zoo's North American Songbird Aviary will inspire conservation actions that prevent these beautiful species from permanently disappearing from our own backyards. 

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Akron Zoo staff volunteering for the Lights Out Akron/Canton program designed to prevent bird window collisions.



The entrance to the Akron Zoo's Welcome Center features glass treated with a film decorated with silhouettes and dots that help prevent bird window collisions.

# Building Trust with an Elusive Species: From shifting to blood collection training with wolverines (*G. gulo gulo*)

*Josh Keller, Zookeeper IV (North America)  
Ashley Wright, Head Zookeeper (North America)  
Columbus Zoo and Aquarium  
Powell, Ohio*



Figure 1. Wolverine (Alvar) 4231. Photo by Amanda Carberry, Columbus Zoo and Aquarium.

## INTRODUCTION

The Columbus Zoo and Aquarium first began housing wolverines in 1991 when the wolverine cabin habitat opened as an addition to the Zoo's North America region. Until 2014, the North American subspecies of wolverine (*G. gulo luscus*) had been exhibited in primarily male-female pairings. In 2014, based on recommendations from the Small Carnivore Taxon Advisory Group (TAG), several zoos moved toward importing European wolverine pairs (*G. gulo gulo*) in cooperation with the European Association of Zoos and Aquaria (EAZA) and the wolverine European Endangered Species Programme (EEP). The Columbus Zoo was part of these initial imports and provided a home to a male and female pair.

Alvar, the male wolverine (Figure 1), arrived from Boras Djurpark Zoo in Sweden in early 2014 while Guillotine, the female wolverine, arrived a few months later from the Reserve Zoologique de Calviac in France. Both arrived at only a year old, without much formal operant conditioning training. Initially, the primary

goal for staff was to develop a relationship with the wolverines since neither regularly chose to interact with keepers or participate in formal training sessions. In 2015, the department experienced staff changes, as well as concurrent exhibit renovations that required the wolverines to remain inside their holding facility for a few months. As a result, the new keepers needed to start back at square one with building a positive relationship with the wolverines.

### TRAINING BEGINS

In early 2016, our first goal for the new wolverine training program was to have the animals shift reliably for regular servicing of their yard. We took our time to ensure the wolverines were comfortable with this behavior so it would not degrade quickly. One of the benefits of progressing slowly was that we were able to train the wolverines to shift into the behind-the-scenes area twice daily. This familiarized the wolverines with being separated from each other and allowed for individual training sessions. Once Alvar and Guillotine were shifting reliably, we identified individual goal behaviors. Alvar is more eager to train and picks up on behaviors very quickly. He remembered the basic behaviors—sit, stand, open—that he was taught by previous keepers, and we were able to build off that foundation. Guillotine was still not particularly trusting, so we continued the goal of building a stronger relationship with her while working toward getting her caught up to Alvar in terms of basic behaviors.

By early 2017, we realized Alvar was ready to be challenged beyond basic behaviors. Our next goal was to train him for a brand new goal of voluntary injections. To help us achieve this goal, we designed a chute out of recycled plastic that our wolverines would walk through to receive their injections (Figure 2). We trained Alvar twice a day, slowly encouraging him to enter the chute, followed by desensitizing him to touching his hip. As we progressed from a capped to a blunted needle, Alvar continually became more comfortable with the entire process. When it came



Figure 2. Alvar in chute

time for the actual injection our training paid off, as Alvar did not react to either of the necessary vaccine injections. With one wolverine successfully injection-trained, we entered 2017 wolverine denning season with high hopes.

### CHALLENGES

Like many northern species, wolverines experience seasonal diet fluctuations, which in turn impact training motivation. This can stall training progress as the wolverines are no longer as interested in participating for their daily diet. The wolverines would both periodically choose not to train during denning season, even for their favorite whole prey items, disrupting training momentum. Since wolverines are delayed implanters, we try to reduce our presence around them during the implantation and denning timeframes in hopes that Alvar and Guillotine will produce offspring. Unfortunately, this also results in reducing our opportunities for training.

After the 2017/2018 denning season we started brainstorming new goals for Alvar. Coincidentally, around this time the Polar Frontier keepers were training polar and brown bears for voluntary blood collections from a vein in the front paw, leading to discussions about whether this would be a possibility for wolverines. Based on previous observations, we knew

our wolverines had no problems sticking their paws through the mesh but were unsure whether paw veins would be large enough to supply a blood sample. While Alvar was under sedation for a routine examination, a Columbus Zoo veterinary technician was able to collect a small sample of blood, supporting our plans for paw blood collection becoming a new training goal.

### BLOOD COLLECTION TRAINING

We started by determining a location in the holding building that would allow the wolverines to present their paw(s) while allowing staff to access the animals effectively and safely. Once we found the perfect spot we began encouraging Alvar to reach his paw out, allowing us to start putting it on cue. Alvar would readily present his paw, though we experienced some difficulty communicating how far we needed him to reach out. We implemented a brick as a paw target, which Alvar learned to reach out even further through the mesh to grip with his front paw.

The next step of the process involved getting Alvar comfortable with having multiple people present. Wolverines are instinctively elusive, and ours are hesitant to participate with two people in close proximity during a training session. We began with asking Alvar to present his



Figure 3. Original blood draw sleeve.

paw with a second person simply kneeled nearby. Though Alvar repeatedly growled when an additional person was present, he still participated in the sessions. He grew more comfortable with the process after we sweetened the deal with some of his favorite whole prey items. As we progressed to begin touching his paw, we needed to ensure the safety of our hands and fingers. A protective guard was added to form a "blood collection chute" (Figure 3). This was a relatively simple design, using recycled plastic attached to the front of the mesh with cable ties.

#### COVID-19 PANDEMIC

While blood collection behavior was progressing well, we still experienced annual decreases in participation during denning season. By the end of denning season in March 2020, the training process to this point took approximately a year and half. March proved to be a challenging month with the onset of the COVID-19 global pandemic. Though life was anything but normal, the shutdown and relative quiet at the Zoo provided us the opportunity to make significant progress in blood collection training. We

introduced clippers to shave the top of Alvar's paw and were able to clip a decent area to allow access to a vein within a couple of sessions. Shortly thereafter, we began inviting the vet tech to sessions to desensitize Alvar to her presence.

As Alvar's comfort increased with the vet tech's presence, we had her touch his paw and feel for a vein. By April 2020, we were confident that we could try to collect blood. We had high hopes as we began our training sessions, but it proved more difficult to get blood than we thought. Alvar continued to do a stellar job—even allowing the vet tech to adjust the needle—but it was a challenge finding a vein. Finding the vein on an awake wolverine was proving to be much more difficult than locating the same vein while the animal was immobilized for a procedure. We continued to move forward with our training at least twice a month in an effort to accomplish our goal.

Much of 2020 ended up the same. We were proud that we had moved our wolverine closer to voluntary blood collection, but felt discouraged that we were unable to finish the behavior completely. The following denning season gave us a much-needed break to step back and reevaluate, heading into the next spring with renewed energy to reach our goal. We modified the "blood sleeve" design to try for blood farther up the front leg. Attaching the protective guard to the inside of the mesh rather than the outside provided access to an extra couple of inches of Alvar's front leg. We worked with Alvar to increase his comfort with being shaved and poked in the new location.

#### SUCCESSFUL BLOOD DRAW

After the 2021 denning season we picked up where we left off with blood collection training. With the modified "sleeve" design Alvar's front leg was more accessible and we were able to shave further up. Our vet tech was able to collect blood during our first attempt! Alvar held the behavior perfectly and we drew approximately 5 mls of blood, enough to run diagnostics (Figure 4).



Figure 4. Successful blood draw.

This allowed us to take Alvar off his bi-yearly physical rotation as his voluntary participation allowed the Animal Health staff were able to run the necessary diagnostics. Guillotine still needs bi-annual physicals, but we are working toward increasing her voluntary participation as she is the more reserved of our two wolverines. While Alvar usually paves the way with new behaviors, Guillotine is not far behind. She has received injections voluntarily and is starting the blood collection training process.

#### CONCLUSION

Overall, we are excited about our accomplishment. Alvar has opened the door for opportunities for this species that were previously undocumented. We hope that Alvar's training and participation in voluntary procedures may contribute to research involving wild counterparts, while inspiring other keepers that work with elusive species. It has set our program on a new course for both current and future pairs of wolverines. With successful voluntary blood collection for diagnostics in the books, we have set our sights on a new goal: plasma banking! Stay tuned! 

## TRAINING TALES COMMENTS BY JAY PRATTE:

Many, many years ago I began my career at a Canadian facility where I was provided the rare and lucky chance to work with wolverines. I have never forgotten how active, intelligent, and unbelievably *capable* of virtually anything these animals are. Conversely, this species has genuinely earned its reputation for potential ferocity (honey badger don't care!). I am not surprised that Alvar was able to learn a blood draw behavior with his dedicated care team. I am impressed at how adept the team was in adopting very new and current techniques (paw blood draws) from other species, while finding safe ways to encourage an inherently dangerous animal to participate. Excellent work.

For my comments this round, I would like to also take a page from the book of bears. As with wolverines, all species of bear exhibit some level of seasonal metabolic change. *How* behaviors and appetites change annually depends on a number of parameters, including (but not limited to): temperature, denning opportunities, ambient noise, presence of other animals, nutritional opportunities presented, etc. Participation often wanes when hormone levels change or metabolism alters

due to seasonal cycles. It is important to note that animals can also become OVER-focused on food during training interactions for the same reason, if their metabolism experiences significant increases. This can actually be exceptionally dangerous if animals become "frantic" for food, during periods of *hyperphagia* as one example. Adapting our expectations, safety protocols, and the food/rewards offered needs to be planned for annually, just as we would plan for specific behaviors such as denning.

Seasonal fluctuations affect training participation, engagement with enrichment, social interactions, and many other aspects of behavioral husbandry. Mammals, birds, reptiles, fish... Virtually all species will exhibit some form of seasonal behavioral change(s). These shifts in behavior and attitude can rapidly increase or decrease; it is a sign of responsible stewardship that animal care staff remain aware of these changes, and plan/alter routines accordingly. Clearly our authors have successfully taken this into account with the wolverines, and experienced tremendous success in reaching their goals as a result!

As always, thank you for submitting your Training Tale!

Wolverine (Guillotine) 8016. Photo by Amanda Carberry, Columbus Zoo and Aquarium.



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## KEYNOTE SPEAKER

### Travis Steffens

Executive Director of Planet Madagascar, and Assistant Professor at the University of Guelph

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